

1. Introduction

Linda Steg, Erik Verhoef, Michiel Bliemer and Bert van Wee

1.1 BACKGROUND

Various developments have put (or kept) road pricing high on the political agenda in most societies. One is the seemingly relentless growth in road transport volumes, causing side-effects such as congestion and pollution, which are among the greatest inconveniences of contemporary urban life. Another is the ongoing improvement in technologies for automated vehicle identification and charging, making sophisticated transport pricing an increasingly attractive option to deal with these side-effects. But also increasing demands on public budgets motivate the search for alternative funding of road infrastructure construction and maintenance.

Most transport analysts would agree that road pricing is a potentially effective instrument for curbing transport and transport-related problems. Likewise, many policy documents, from local authorities, as well as national and international governments, identify road pricing as one of the key cornerstones of contemporary transport policies, and support this by a variety of arguments, ranging from effectiveness and economic efficiency to considerations of fairness and transparency in the financing of infrastructure (the 'user-pays principle'). But public acceptability often seems to be lagging behind, so that actual implementations, although growing in number, remain scarce. Nevertheless, with the introduction of the London congestion charge in 2003 (see also Chapter 14), and the implementation of charging in Stockholm in the Summer of 2007 (see also Chapter 10), one might hypothesize that urban road pricing is entering a new phase in its history, and will soon spread over Europe and other parts of the world.

Although past research has produced many valuable insights into the workings and possible effects of road-pricing measures, there are still many unanswered questions, involving, *inter alia*, the optimal design of such measures, the (behavioural) effects they may induce among individuals and firms, and questions surrounding the acceptability of road pricing. These and related questions stimulated us to write this book.

1.2 AIM OF THE BOOK

This book aims to provide a multidisciplinary view on the effectiveness and acceptability of pricing in road transport.¹ After a general introduction to road pricing, four topics will be addressed. First, we elaborate on the possible behavioural responses to road pricing. Second, we illustrate how model studies may assist in designing optimal road-pricing policies, given different policy objectives. Third, we describe the acceptability of different types of road-pricing policies by the general public and firms, and indicate how such policies may affect geographical accessibility. Finally, we discuss to what extent road pricing has actually proved to be effective, and indicate the prospects for implementing transport infrastructure pricing in Europe.

1.3 OVERVIEW OF THE CHAPTERS

In Chapter 2, Erik Verhoef provides a basic introduction to the economic theory of road pricing. Introducing concepts and terminology, this chapter serves as a lead-in to the further chapters in this book. Moreover, Verhoef reviews the possible objectives of road pricing, and indicates that the optimal design of road-pricing schemes depends on the objectives set by the relevant authorities. The remainder of the book comprises four parts.

Part I elaborates on the behavioural responses to road pricing. In Chapter 3, David Hensher and Sean Puckett discuss the effects of road pricing on freight transporters and shippers. More specifically, they compare the potential effects of increases in fuel prices (the current main source of charging) and distance-based charges in freight transport. In addition, they examine which of these pricing policies is preferred most by transporters, and why this is so.

As pointed out by Hensher and Puckett, road pricing may especially result in travel-time reliability gains, which in turn have an impact on agents' decision making. Taking this subject further, in Chapter 4, Dirk van Amelsfort, Piet Bovy, Michiel Bliemer and Barry Ubbels indicate how travel-time unreliability may be taken into account in modelling travellers' choice decisions. They discuss different approaches to modelling travel-time unreliability in a discrete choice setting, which may give rise to different values of travel-time reliability, and they argue which value of travel-time unreliability is in their view most plausible. Furthermore, they examine whether it is possible and worthwhile to separate the effects of travel-time reliability on travel-choice behaviour.

Barry Ubbels, Taede Tillema, Erik Verhoef and Bert van Wee analyse the effects of kilometre charging on changes in car use, car ownership and

relocation choices of households in Chapter 5. Some of these changes are more likely to occur in the short term (for example, driving at other times), while others concern long-term changes (for example, changes in car ownership or relocation decisions). The authors elaborate on which types of car trips are most likely to be affected by road pricing, and which types of charges would be most successful in bringing about changes in car use.

Chapter 6 focuses on effects of road pricing on firms. Taede Tillema, Bert van Wee, Jan Rouwendal and Jos van Ommeren argue that road pricing may affect firms' decisions in various ways: road pricing may affect not only firms' travel behaviour, but also their business and human resource policies. The authors consider the effects of kilometre charging on trip frequency, time of travel and types of trips (for example, business or transport of goods). Moreover, they examine to what extent firms intend to reimburse their employees, which may seriously affect the effectiveness of kilometre charging on commuter trips. Also, they describe to what degree firms consider mitigating (extra) costs due to a kilometre charge by increasing the price of their goods and services, and whether firms plan to relocate if a kilometre charge is implemented.

Part II focuses on the modelling effects of transport pricing. Three chapters discuss ways to design optimal road-pricing policies, given different policy objectives. Chapter 7, by Michael Bell and Muanmas Wichienso, considers the setting of an optimal congestion charge consistent with the commercial decisions to transit operators. The authors argue that the reactions of transit operators on congestion charging should be considered, as these will influence traveller costs, which will in turn affect the optimal congestion charge. They analyse the impact of profit-maximizing transit fare setting on the social surplus under a range of congestion charges, and examine the competitive advantages of tolling for transit operators.

In Chapter 8, Dusica Joksimovic, Michiel Bliemer and Piet Bovy argue that the macroscopic results of road pricing should be understood from their micro foundations, that is, the behaviour of the individual actors. The authors introduce game theory as an appropriate way to do this, and present the results from a series of game-theoretic studies to illustrate their proposition. They show that, in this setting as well, the optimal design of a road-pricing policy (for example, toll level) depends greatly on the main policy objective set.

Chapter 9 focuses on time-varying optimal toll designs. Michiel Bliemer, Dusica Joksimovic and Piet Bovy consider uniform and time-variable tolls during the peak, taking route choice and departure time choice responses of travellers into account. They demonstrate that policy objectives can be optimized by imposing tolls, and that different policy objectives lead to different optimal tolling schemes and toll levels. Thus, this chapter once

more illustrates that the optimal design of road pricing depends on the policy objectives.

Part III focuses on the acceptability of different types of road-pricing policies. The first two chapters discuss the acceptability of road pricing among the general public. In Chapter 10, Tommy Gärling, Cecilia Jakobsson, Peter Loukopoulos and Satoshi Fujii discuss how acceptability judgements may best be derived. Next, they present a theoretical framework to account for determinants of acceptability, and examine to what extent these determinants actually explain public acceptability of the Stockholm congestion charge scheme. They hypothesize that road pricing is more acceptable if individual car users are aware of the problems caused by car use, whether they expect the road-pricing scheme to be effective in reducing these problems, and whether the road-pricing scheme will affect their own car use.

Geertje Schuitema, Barry Ubbels, Linda Steg and Erik Verhoef further investigate the relationship between effectiveness and acceptability of road pricing in Chapter 11. Like Gärling et al., they argue that individual car users will consider two types of effects when evaluating the acceptability of road pricing: effects on the problems resulting from car use (for example, congestion) and effects on their own car use. They contend that the latter will depend on the degree to which a car user can cope with expected cost increases, which will be related to factors like annual kilometrage, income and price level. Next, they examine how acceptability judgements are related to possibilities of evading transport-pricing policies, and the extent to which car users are compensated for negative consequences via revenue allocations.

One way in which car users may benefit from road pricing is increased accessibility. Taede Tillema, Tom de Jong, Bert van Wee and Dirk van Amelsfort determine, in Chapter 12, to what extent various factors may affect changes in accessibility due to road pricing. Among these factors are the value of time, and characteristics of the road-pricing measure (for example, price level). They first assess the effects of a time-differentiated kilometre charge on accessibility in general, and next examine whether accessibility is sensitive to variations in value of time, characteristics of the road-pricing measure, and types of costs and benefits considered by those involved. They argue that various types of costs and benefits should be taken into account when assessing the effects of road pricing on accessibility, and that approaches focusing only on travel-time gains may not provide an accurate picture in this respect.

In Chapter 13, Linda Steg, Taede Tillema, Bert van Wee and Geertje Schuitema discuss the acceptability of road pricing by firms. As in Chapters 10 and 11, they focus on the relationships between the effectiveness and

acceptability of road pricing. They start from the reasonable assumption that, if firms are more likely to suffer from road pricing, kilometre charging will be less acceptable to them, while it will be more acceptable if firms benefit from it. Firms may consider various costs and benefits, such as the expected changes in travel costs and accessibility of firms. The last two effects in particular are considered in this chapter.

Finally, Part IV discusses both the past and the future of road pricing. In Chapter 14, Georgina Santos discusses the London Congestion Charging Scheme. She provides a thorough and critical discussion of the background, design, effects, and costs and benefits of the scheme, and indicates its 'winners' and 'losers'. Furthermore, she elaborates on the possible effects of extending the scheme.

Chapter 15 identifies some prospects for transport infrastructure pricing in Europe. In this chapter, Chris Nash provides an overview of progress on the EU transport-pricing policy. He concludes that actual progress towards more efficiency in transport-pricing has been slow. He provides various reasons for this lack of progress, and indicates how some of these barriers may be overcome.

The final chapter summarizes the main conclusions of the book. On the basis of these, various suggestions for future research are indicated. Furthermore, the main implications for transport policy are described. Overall, the chapters in this book indicate that it should be feasible to implement road-pricing policies that are both effective in reducing transport and traffic problems and acceptable to the public and to firms.

NOTE

1. Many chapters report on research that was carried out in the context of the Dutch NWO/Connekt VEV project on 'A Multidisciplinary Study of Pricing Policies in Transport'; the financial support of NWO is gratefully acknowledged. This applies to all chapters, except Chapters 2, 3, 7, 10, 14 and 15.